



# User's Guide to the VOCs in Soils Presumptive Remedy

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Office of Emergency and Remedial Response

User's Guide

In order to expedite remedy selection at similar types of sites, EPA recommends the use of presumptive remedies — preferred technologies for common categories of sites, based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation. This User's Guide recommends the soil vapor extraction (SVE) technology as the preferred presumptive remedy for sites where volatile organic components (VOCs) are present in soil and treatment is warranted, although the thermal desorption and incineration technologies may be selected as presumptive remedies at sites where conditions are appropriate. Presumptive remedies are expected to be used at all appropriate sites except under unusual site-specific circumstances. This guide is based on the VOCs in Soils Presumptive Remedy Guidance, *Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils*, OSWER 9355.0-48FS. Please refer to that guidance for a more detailed description of how the presumptive remedy can be applied at sites where volatile organic components (VOCs) are present in soil.

## PURPOSE

This User's Guide is intended to aid the site manager. It:

- Explains the benefits of using the "presumptive remedy approach";
- Highlights how to decide if the presumptive remedy approach can be applied to your site;
- Explains which presumptive remedy approach to select for your site (the preferred presumptive remedial alternative for sites with VOCs in the soils is soil vapor extraction (SVE));
- Describes how to write the feasibility study (FS) or engineering evaluation/cost analysis (EE/CA) for a presumptive remedy; and
- Outlines administrative record requirements.

## WHY USE THE PRESUMPTIVE REMEDY APPROACH?

Time and cost savings can be realized by following the presumptive remedy approach during a remedial investigation/feasibility study (RI/FS). First, since a preferred cleanup technology can be identified prior to or early in the RI, technology-specific remedial design data can be collected and analyzed sooner. In addition, use of the presumptive remedy approach eliminates the need to:

- Identify potential treatment technologies
- Screen technologies in your site-specific FS or EE/CA.

In addition, the steps of assembling technologies into alternatives and reducing alternatives are streamlined since the number of technologies under consideration have been minimized. Figure 1 presents the presumptive remedy technologies for VOCs in soils and important features of each.

Figure 1. Presumptive Remedies for VOCs in Soils

### Soil Vapor Extraction (SVE): *The preferred presumptive remedy*

- In-situ process
- Removes contaminants from vadose zone soils by inducing air flow through the soil
- Highly cost effective alternative
- Vapor treatment may be required

### Thermal Desorption

- Soil excavation required
- Uses direct or indirect heat to vaporize VOCs from soil
- Vapor treatment may be required

### Incineration

- Soil excavation required
- Employs thermal decomposition via oxidation
- Destroys the organic fraction of the waste
- Vapor treatment may be required

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## CAN YOU APPLY THE VOCs IN SOILS PRESUMPTIVE REMEDY APPROACH TO YOUR SITE?

In order to determine if you can use the presumptive remedy approach at your site, you need to answer the following questions. Regardless of the status of your RI or removal evaluation, these questions can be addressed once you establish the nature of any VOC and non-VOC waste contained in the soil, where treatment is warranted.

### Are VOCs present in soil or sludge?

VOCs include halogenated and non-halogenated organics such as trichloroethylene, carbon tetrachloride, acetone and benzene. A complete list of typical VOCs is found in the master VOCs presumptive remedy guidance referenced on page 1. If your site does not have VOCs in the soil, then this User's Guide is not applicable for use in remedy selection at the site.

### Are non-VOCs present that will preclude the use of the presumptive remedy guidance?

For sites with a mixture of VOCs and other contaminants in soil, the presumptive remedies should be considered only if they also can also be effective in removing the non-VOC contaminants, or can be used in combination with other remedies. For combination remedies, this presumptive remedy approach can be used to select the VOC portion of the remedy. For example, sites with VOCs and metals commingled in soil may be effectively remediated by employing SVE to remove VOCs and fixation or solidification

to address the metal contamination. The presumptive remedy approach can still be used for the selection of the SVE remedy, whereas a traditional FS analysis would be necessary for the treatment of metals.

In conclusion, if VOCs are present in soils and non-VOCs do not preclude a VOC remedy, you may also select the presumptive remedy for the VOC component of the site.

### Have all key stakeholders been notified?

Please keep in mind that it is important to notify the community, (especially any community working groups) the State, and any PRPs that a presumptive remedy is being considered at your site. It is important to get their buy-in early in the cleanup process.

This notification should begin as early as possible and can continue to occur throughout the RI/FS in the form of fact sheets and agenda items during public meetings. Early discussions about the rationale for presumptive remedies creates confidence in both the technology and remedy selection process.

Once a candidate presumptive remedy site has been identified and a response action involving treatment is warranted under the NCP, you can decide which of the 3 VOCs in soils presumptive remedy technologies to select.

## WHICH VOCs IN SOILS PRESUMPTIVE REMEDY IS BEST FOR MY SITE?

Once you have determined that your site is a candidate for a presumptive remedy, SVE should be analyzed first since it is the preferred presumptive remedial alternative. In most cases, SVE is extremely cost effective and can be implemented in-situ. The SVE Checklist (Figure 2) can help you decide if SVE is appropriate at your site<sup>1</sup>. The questions posed in the SVE Checklist provide a preliminary "first-cut" assessment of basic site characteristics that relate to potential SVE treatment effectiveness. Your site is a strong candidate for SVE if you answer "yes" to all of these questions. At this point, you may wish to assume SVE as the preferred technology for VOC remedial action at your site. Therefore, you may immediately proceed to an SVE Pilot Study and a Presumptive Feasibility Study (see p. 3).

For the purposes of this User's Guide, the terms "Presumptive FS or EE/CA" refer to the FS or EE/CA developed at sites where the presumptive remedy is applied. The SVE Checklist is not a definitive screening test for SVE. So, even if you answer "no" to one or more of these questions, SVE may still be an appropriate presumptive technology for your site, but greater technical analysis may be warranted. Considerations such as best professional judgment and community opinion should guide your decision to proceed with an SVE Pilot Study to confirm the appropriateness of the SVE technology at your site.

If SVE is determined to be ineffective based on site-specific circumstances, thermal desorption is the next technology that should be assessed for use at your site. Thermal Desorption is the primary VOC presumptive remedy at sites where soil excavation is required to remediate a non-VOC contaminant. At some sites, public perception is that incineration can be disruptive to a community, and it has been ruled out due to that perception. Be aware of this if you prove incineration as a remedy. For a complete discussion of the characteristics that affect the use of SVE, thermal desorption and incineration technologies, refer to Tables 3 and 4 of the master VOC presumptive remedy guidance.

Figure 2. SVE Checklist

Site Characteristics <sup>2</sup>	Yes	No
Soil Permeability > 10 <sup>-6</sup> cm <sup>2</sup>		
Soil Moisture Content < 50%?		
VOC Vapor Pressure > 0.5mm Hg?		
Dimensionless Henry's constants > 0.01?		
Soil/Air Filled Porosity < 40%?		
Low organic carbon content?		

<sup>1</sup>If you are scoping an RI or a removal evaluation, the information requested in Figure 2 should be identified as a "presumptive remedy data need" along with common data needs for an RI/FS. As you develop the RI/FS Work Plan, you should establish site-specific data quality objectives for each set of RI data needs. All presumptive remedy data needs should be collected during the first round of environmental data collection of the RI if not before.

<sup>2</sup>See Table 4 of the VOCs in Soils Presumptive Remedy Guidance for a description for each of the terms listed in Figure 2.

## HOW DO I WRITE THE FS OR EE/CA FOR A PRESUMPTIVE REMEDY?

After determining that your site can use a VOCs in soils presumptive remedy, the next step is to prepare a presumptive FS or EE/CA. Note that for non-time-critical removals, you can prepare an EE/CA. Regardless of the status of your RI or removal evaluation, the Presumptive FS or EE/CA for the soil remedy should begin immediately.

As highlighted on page 1, the presumptive remedy approach allows you to streamline and focus the FS or EE/CA by eliminating the technology screening step because EPA has already conducted this step on a generic basis in the document *Feasibility Study Analysis for VOCs in Soils Sites*. Basically, only the "No-Action" alternative and presumptive remedy alternative require further consideration. If SVE is appropriate, the other presumptive technologies (thermal desorption and incineration) may be eliminated from further consideration. To tailor the Presumptive FS to the specific conditions at your site, you may first need to refine the presumptive remedy alternative, as necessary. For example, if off gas treatment is required, the technology for off gas treatment is not selected presumptively and should be addressed in the FS. As shown in Figure 3, the presumptive technology should be matched with an appropriate mix of conventional and innovative vapor treatment technologies. The final step of the Presumptive FS would consist of analyzing the No-Action and Presumptive Remedy alternatives against the nine NCP evaluation criteria.

An example format for critical elements of a Presumptive FS is provided in Figure 4. Please note that it is advisable to expand the Introduction Chapter of your Presumptive FS or EE/CA to include a brief discussion of the presumptive remedy approach and justification for using this approach at your site.

You may wish to consider technologies that enhance the performance of the presumptive remedy based on site-specific conditions. For example, SVE enhancements include bioventing, capping, hot air injection, steam injection, and subsurface mining. Additionally, you may consider using a phased approach to designing and implementing an SVE system similar to EPA's suggested phased approach to characterizing and remediating contaminated groundwater

sites. In order to maximize engineering flexibility during remedial design and remedial action, it is not always necessary to address potential enhancements in your Presumptive FS. Only where: (a) there is a high degree of confidence that the enhancement is essential for cost-effective remediation; or, (b) the addition of the enhancement significantly changes the cost or scope of the base SVE alternative, should such enhancements be included in the Presumptive FS. For more information on whether to include enhancements in your FS and determining what would require changes to a ROD, see "Guide to Addressing Pre-ROD and Post-ROD changes, OSWER 9355.3-02FS-4, April 1991.

**Figure 3. Example of a Possible SVE Alternative Refinement**

- Alternative 1 - No Action
- Alternative 2 - SVE with No Off Gas Treatment
- Alternative 3 - SVE with Off Gas Treatment (e.g. activated carbon, catalytic oxidation, flameless thermal oxidation, resin adsorption, etc.)
- Alternative 4 - SVE with Off Gas Treatment and Capping

**Figure 4. Example Format For Critical Elements of A Presumptive FS**

- I. Introduction
  - A. Background to the Site
  - B. Introduction to the Presumptive Remedy Approach
  - C. Determination to use the Presumptive Remedy Approach
- II. Description of the No Action Alternative, the Presumptive Remedy Alternatives, and ARARs
- III. Detailed (Nine Criteria) Analysis of the No Action Alternative and the Presumptive Remedy Alternative
- IV. Description of the Preferred Alternative
  - A. Rationale for the Preferred Alternative

## ADMINISTRATIVE RECORD REQUIREMENTS

You must compile an administrative record in accordance with the *Final Guidance on Administrative Records for Selecting CERCLA Response Actions*, OSWER Directive 9833.3A.1. The administrative record must contain both EPA guidance and site-specific information documenting the selection of the VOCs in soils presumptive remedy. Other required EPA guidance documents include:

- *Presumptive Remedies: Policies and Procedures*, OSWER 9355.0-47FS
- *Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with VOCs in Soils*, OSWER 9355.0-48FS

- *Feasibility Study Analysis for VOCs in Soils Sites*, OSWER 9356.0-01. [Note: The administrative record file index should include a notice specifying the location of and times when public access is available to the generic file-of backup materials used in developing this document. The generic file contains background materials such as technical references and previous feasibility studies. Each EPA Regional office has a copy of this file.]
- "Guide to Principal Threat and Low Level Threat Wastes," OSWER 9380.3-06FS

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